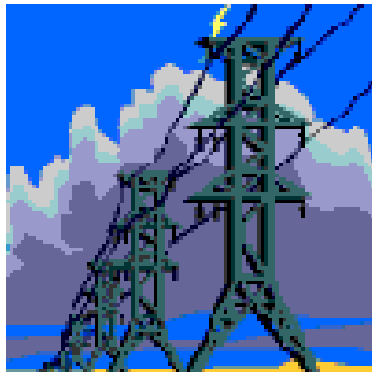




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SF₆ Emissions Reduction Strategy at ComEd Substations

Mark Slezak

Steve Scalcucci

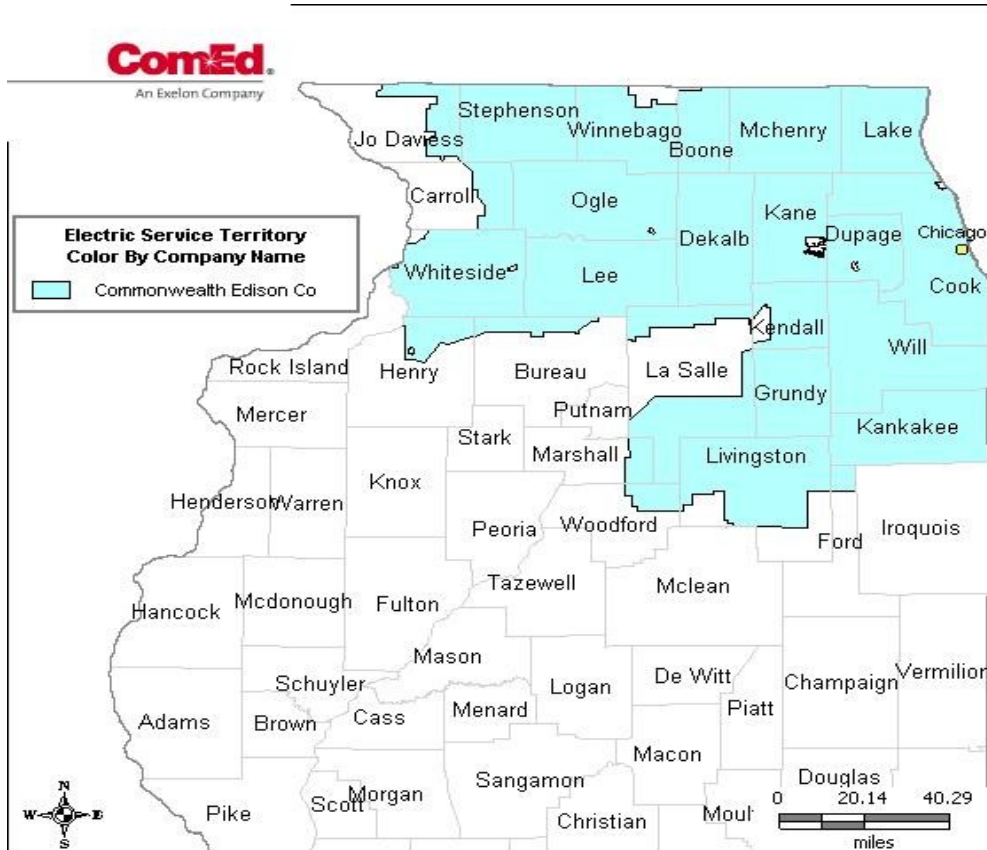
Tom Lambert

Tim Griseto

EPA Workshop – Phoenix, AZ

February 2009

ComEd Service Territory



Commonwealth Edison Company (ComEd) is a unit of Chicago-based Exelon Corporation (NYSE: EXC), one of the nation's largest electric utilities with approximately 5.4 million customers.

ComEd provides service to approximately 3.8 million customers across Northern Illinois, or 70 percent of the state's population.

In the fall of 2008, Exelon Corporation announced its comprehensive plan (Exelon 2020) to reduce, offset or displace more than 15 million metric tons of greenhouse gas (GHG) emissions per year (in carbon dioxide-equivalent terms) by 2020.

Exelon 2020 has a three-pronged strategy for achieving this ambitious climate goal:

- Reduce or offset Exelon's carbon footprint.
- Help our customers and the communities we serve reduce their greenhouse gas emissions.
- Offer more low-carbon electricity in the marketplace.



In 2006, T&S achieved ISO14001 certification which paved the way for all of ComEd. In 2008, ComEd achieved ISO14001 certification.


In addition, ComEd T&S has become a key player in achieving the Exelon goal of reducing its greenhouse gas emissions by more than 8% below 2001 levels in 2008 and further reductions in 2009 and beyond.

ComEd T&S has enhanced its SF₆ management and leak reporting & repair by:

- ✓ SF₆ Leak Reporting
- ✓ Employee Engagement
- ✓ SF₆ Leak Detection / Camera / PM Program
- ✓ SF₆ Handling Procedure / Training
- ✓ SF₆ Handling Equipment

With this enhanced SF₆ reduction strategy, ComEd T&S decreased its leak rate every year

SF₆ Environmental Alert



EXELON ENERGY DELIVERY YELLOW – LL/OE COMMUNICATION

Date: March 20, 2008 CE-EN-112 Effective Date: ASAP

Alert Type: Environmental Bulletin

SF₆ Leak Reporting

Affected Department(s): Transmission Operations, Technical Services, T&S, DSO and ESD.

FUNCTIONAL AREAS AFFECTED													
AD	AM	BO	CM	CS	EA	EN	EP	EX	FM	GO	HR	IT	OP
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
PC	QA	RE	SA	SM	VM	TQ	WM						
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>						

Affected Level(s): All T&S and Area Operating Managers, FLS's and Field Crews. Communicate this and provide the sign off documentation.

Summary: New expectation or Revised expectation

Over the past few years Exelon Energy Delivery has implemented a proactive approach to leak and spill reporting for all oil handling and oil filled equipment. Sulfur Hexafluoride gas, SF₆, used as insulation in certain types of electrical equipment, is a global warming gas, that, when released to the atmosphere, can trap heat in creating a greenhouse effect. SF₆ is a potent global warming gas. When released, the gas remains in the atmosphere over 1,000yrs and has a global warming potential 23,900 times that of CO₂, meaning 1lb of SF₆ is equal to 23,900 lbs of CO₂. A release of 1lb of SF₆ is equivalent in Greenhouse Gas emissions as driving 2 cars for a year. SF₆ leak reduction contributes to Exelon's achievement of an USEPA climate leaders initiative. The initiative requires Exelon to reduce Greenhouse Gas (CO₂) 8% below the 2001 baseline year

Purpose and Details of Change:
ComEd Energy Delivery will formalize the reporting of SF₆ leaks as "Environmental Events". The reporting process will be specific for SF₆ although the leaks or releases will be tracked as an "environmental incident". For example, when SF₆ is added into a particular piece of equipment due to potential leaks and or possible equipment deficiencies, we will report the amount added back into the equipment, as the amount that had leaked into the atmosphere. The new expectation will be to identify, report and make repairs to the equipment that is leaking to prevent future SF₆ leaks. The procedure CM-ED-332033 for adding SF₆ into circuit breakers in service, now has Level 1 checklists that will be used to track how much SF₆ was added back into the breaker and then in turn that check list will then be sent to the Environmental Coordinators via a fax (Fax Number 630/576-6351) and a phone call to the OCC reporting the leak (just like we currently practice for oil spills, battery acid and mercury spills), and the amount added will be reported as the amount that leaked. The intent is to proactively take control and put more rigor around leak identification, repairs and overall SF₆ usage. For more information, CM-ED-300001 describes how to handle SF₆ gas and how to minimize any potential releases.

Alerts Archived on EED Environmental WEB Page - <http://exelonwss.exeloncorp.com/eed/esih/environmental>

Method of Employee Notification through out the company:

- Environmental Alert-communicates the reporting requirement for SF₆
- Yellow is a read and sign by all
- Communicated via Morning safety huddles.



SF₆ Leak Reporting / Employee Engagement

Please complete while working a release during the work week back shift, as well as, weekends, and holidays.

Then forward completed sheet to the Regional ESD Environmental Coordinator the following business day.

ComEd ESD MATERIAL RELEASE LOG

PREPARED BY		OMS Ticket No.:		WorkOrder No.:	06596613	Priority:	20
M. TITRE		Dispatcher:		at X		Duty FLS:	Bill Lones
		EQUIPMENT #:	L10345 BUS 4		FLS Phone #	630-985-4050	
TRANSFORMER #	TSS103 Lisle	OVHD		PAD		KVA	34
1. ComEd PERSON REPORTING RELEASE	Terry @ OCC 815-463-2900/Blk. Pwr. 630-932-3702						
2. DATE OF REPORT	1/7/2009	TIME OF REPORT	0912				
3. ON SCENE CONTACT	Bill Lones	OUTSIDE TELEPHONE #	630-985-4050				
4. LOCATION OF RELEASE (INCLUDE COUNTY AND ANY BODY OF WATER PRESENT).*							
STREET/RD	TSS103	CITY	Lisle		COUNTY	DuPage	
RIVER/LAKE	None	EED Area	BOL				
5. DATE OF RELEASE	1/6/2009	TIME OF RELEASE	Unknown				
6. MATERIAL RELEASED	SF6	QUANTITY	ADDED 1.5 LBS				
7. Area Affected (sq. feet)	Atmosphere unknown						
8. CAUSE OF RELEASE	Equipment failure						
9. EXTENT OF INJURIES	None						
10. CONTAINMENT/CLEANING ACTIONS UNDERTAKEN							
1.5 lbs. SF6 added							
11. COMMENTS	Follow up with Environmental on what repair actions were taken.						

RELEVANT INFORMATION & CONTACTS:

NOTE: Mailing address (Environmental Services Department, Three Lincoln Center, 3rd Floor, Oak Brook Terrace, IL 60181-4260) for all follow-up correspondences. RD-116 letter is required by MWRD 5 calendar days after reportable release occurs.





The camera, plus a preventive maintenance program has helped us identify SF₆ leaks quicker and reduce the amount of SF₆ released in the atmosphere.



Microsoft Word Document





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SF₆ Emissions Reduction Strategy at ComEd Substations

- 1 - Engaging Employees in SF₆ Practices**
- 2 - Improvements in SF₆ Recovery**
- 3 - SF₆ Handling Procedure**

Tom Lambert (Methods)

**EPA SF₆ Workshop – Phoenix, AZ
February 2009**

SF₆ Emissions Reduction Strategy



EN-ED-P043
Rev. 0
Page 1 of 8
Effective Date: 11/1/2007

FUNCTIONAL AREA													
AD	AM	CM	CS	EA	EN	EP	FI	EX	FM	GO	HR	IT	OP
X	X	X			X								X
PC	QA	RE	SA	SM	TQ	VM	WM						
X			X	X	X		X						

Sulfur Hexafluoride (SF₆) Management Program

1. PURPOSE

1. To provide guidelines for the management of SF₆ including

- Usage
- In-Service
- Equipment Inventory
- Maintenance Process
- Reporting Criteria

2. TERMS AND DEFINITIONS

1. **USEPA MOU:** United States Environmental Protection Agency Memorandum of Understanding.

Note: The MOU is a voluntary agreement between EED and USEPA to minimize the releases of SF₆ gas.

2. **SF₆ Gas:** Sulfur Hexafluoride is a greenhouse gas which remains in the atmosphere for 3,200 years. One pound of SF₆ is equivalent to 23,900 pounds of CO₂.

3. RESPONSIBILITIES

3.1 EXELON CORPORATE ENVIRONMENTAL SERVICES

1. **OVERSEES** the Climate Leadership partners program


2. **ACTS** as governance for proper SF₆ management

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1. Evacuation
2. Filling
3. Recovery





Exelon Delivery
Technical Procedure
Sulfur Hexafluoride Gas SF₆ Handling

CM-ED-300001
Rev. 1
Effective: 2/25/2008
(Supersedes MP-4.2.3.3)
Level: 2
Page 1 of 25

1. PURPOSE

To provide guidelines for provide direction for Exelon Energy Delivery (EED) and contract individuals involved in handling sulfur hexafluoride (SF₆) gas, specifying safe working procedures for the maintenance and installation of equipment containing SF₆ gas

To specify safe working procedures for

- Handling SF₆ gas
- Filling SF₆ gas
- Removing SF₆ gas
- Disposing of hazardous by-products.

Section 5 Safety and Environment Concerns has been divided into the following subsections:

Subsection	Title	Page
5.1	Safety Measures	5
5.1.1	Suffocation Hazard	5
5.1.2	Decomposition Gases and Solid By-Products	6
5.1.3	SF ₆ Handling	7
5.1.4	SF ₆ Cylinders - Equipment Filling and Recovery	7
5.1.5	OSHA On Respiratory Protective Equipment	8
5.1.6	S&C Circuit Switcher Interrupters	8
5.2	Environmental Concerns	9
5.2.1	Greenhouse Gas	9

Section 8 has been divided into the following subsections:

Subsection	Title	Page
8.1	Hoses, Fittings and Accessories Care and Handling	10
8.1.1	SF ₆ Cylinders	10
8.1.2	Service Hoses	12
8.1.3	Service Couplings, Valves and Fittings	12
8.2	Filling Equipment with SF ₆ using a Gas Handling Apparatus Processing Cart	13
8.3	Filling Equipment with SF ₆ using a Gas Handling Apparatus Transfer Cart / Cylinder	13
8.4	Filling or Topping with SF ₆ from a Cylinder	14
8.5	Removal of SF ₆ from In-Service Equipment	15
8.6	SF ₆ Distribution System Switches	16
8.7	SF ₆ Recycling Units and Filters	16
8.8	SF ₆ Cylinder Weighting	17

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SF₆ – The SUPER Insulator!

The Six Fluorine Atoms bonded to the Sulfur Atom: HOLDS ELECTRONS
Stronger than any other molecule! Likened to Superman, SF₆ has a weakness –

Moisture! (Air)



Engaging Employees in SF₆ Policies & Procedures

❖ Environmental Symposiums

Hosted by ComEd's T&S Leadership and Environmental Team in all four geographic regions with Managers, Operations Coordinators, Supervisors and Crew Leaders

❖ Substation Training

2008 for all Substation Technicians with six hands-on performance exercises

❖ ISO 14001 Certification

ComEd employees at numerous facilities participated in this audit



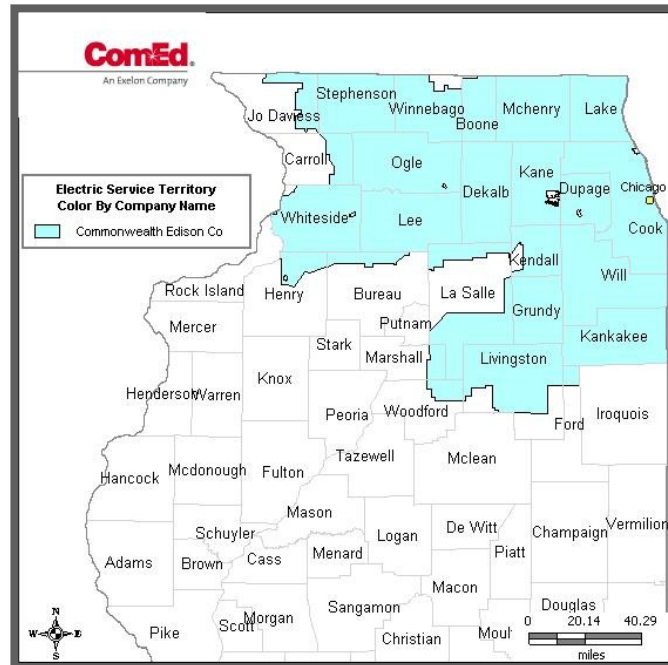
SF₆ Evacuation, Filling, and Recovery Hands-on Exercise (Shown Above)



ComEd Service Territory - SF₆ Handling Equipment



**Dilo Mini Plus
Model D320**
4 Currently
6 New in 2009
10 Total



Dilo Model B120
5 Total
Permanently Located
@ Each Gas Insulated
Gear Location



Barons SF₆ Trailer
2 Older Units



Dilo SF₆ Mega Trailer
NEW in 2009



Limco SF₆ Trailer



SF₆ Fittings and Adaptors Kit



765kV Bus-Tie Breaker removal

May 2008 – Nov 2008

SF₆ gas evacuated

Parts removed used for repair of leaking Bus-Tie

Successful removal of a breaker position that was unneeded

Eliminated of Environmental risk of 1800 lbs of SF₆ (43 million pounds of CO₂)



Before



After

- ✓ Engaged employees to take ownership for reducing the carbon footprint through hands on training and regional forums
- ✓ Formalized the reporting of SF₆ leaks
- ✓ Developed SF₆ handling procedure to shift from reactive to proactively preventing issues
- ✓ Improved SF₆ filling, recovery, evacuation through purchase of updated and standardized equipment for the ComEd system
- ✓ Added rigor around leak identification through use of SF₆ camera
- ✓ Formalized a SF₆ preventative maintenance program
- ✓ Identified and Removed SF₆ equipment no longer needed for system configuration

Comments

Questions

